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PUC PROJECT NO. 51840

RULEMAKING ESTABLISHING ELECTRIC WEATHERIZATION STANDARDS	§ § §	**BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS**

LCRA TRANSMISSION SERVICES CORPORATION'S RESPONSE TO COMMISSION STAFF'S REQUEST FOR COMMENTS

TO THE HONORABLE PUBLIC UTILITY COMMISSION OF TEXAS:

LCRA Transmission Services Corporation (LCRA TSC) appreciates the opportunity to offer comments in response to the questions posed by the Staff of the Public Utility Commission of Texas (PUC or Commission) in this project.

I. INTRODUCTION

LCRA TSC is a nonprofit corporation and instrumentality of the Lower Colorado River Authority (LCRA) created in 2000 to facilitate LCRA's structural unbundling following the passage of Senate Bill 7. LCRA TSC has the authority to carry out LCRA's governmental functions and contributes funds for LCRA's statutory obligations, including public safety, parks management, water quality, and long-term water supply infrastructure. LCRA TSC provides wholesale transmission, transformation, and metering services in the Electric Reliability Council of Texas (ERCOT) region in accordance with Commission rules and the ERCOT Protocols and Operating Guides. As a Transmission Service Provider (TSP), LCRA TSC owns or operates over 5,500 circuit miles of transmission lines and owns facilities in approximately 420 substations. LCRA TSC also serves as a Transmission Owner, Transmission Operator and Transmission Planner registered with the North American Electric Reliability Corporation (NERC).

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II. RESPONSE TO QUESTION 2

Question 2:

To fulfill the requirements of Texas Utilities Code § 38.075(a), under what weather emergency conditions should the Commission require an electric cooperative, municipally owned utility, or transmission and distribution utility providing transmission service in the ERCOT power region to be able to operate its transmission facilities? At a minimum, please address standards for temperature, icing, wind, flooding, and drought conditions. For each, please address whether the standard should vary by region or by type of generation facility. Please provide any relevant support for your recommendations, including existing or proposed standards in other jurisdictions, or related studies.

Electric transmission systems are planned to transmit large quantities of electrical power over significant distances. Due to their expansive nature and exposure to the elements, overhead electric transmission systems are susceptible to a variety of factors that put them at risk for an outage, including inclement weather. Electric transmission system owners and operators like LCRA TSC adhere to various design standards and operational best practices to minimize the impacts of inclement weather and potential subsequent interruptions of service to end-use customers. These standards and practices are designed to reduce the frequency of outages and, should an outage occur, minimize its duration. LCRA TSC urges the Commission to move forward with implementing the weatherization requirements of Senate Bill 3 by reference to these existing standards, which have been developed over decades of collective industry experience and are described in more detail below. The Commission's rules should also promote accountability through clear reporting requirements, as the Commission has successfully employed in implementing many other legislative initiatives.

A. Overview of Electric Transmission Design Standards

LCRA TSC adheres to good utility practice and a range of industry standards to ensure electric transmission facilities maintain their physical integrity and are designed to withstand weather-related emergency conditions. The Public Utility Regulatory Act (PURA) specifically

requires adherence to the clearance standards set forth in the National Electrical Safety Code (NESC), which is one of the primary sets of criteria to ensure the safe and reliable operation and maintenance of overhead transmission facilities.[1] In LCRA TSC's experience, these and other industry standards have served well to maximize the conditions under which an electric cooperative, municipally owned utility, or transmission and distribution utility that adheres to these standards is able to safely and reliably operate its transmission facilities. The specific requirements imposed by these standards generally recognize that the conditions that influence the design and operation of transmission facilities can differ considerably; accordingly, they allow utilities to account for variations in expected conditions for different types and vintages of facilities located in different geographic areas. A high-level summary of these standards, and how LCRA TSC translates them into specific and measurable actions, is provided in the table below.

Weather Emergency Condition	**Applicable Industry Standard(s)**	**Aspects of Facility Design and Construction**
I. Hurricane (wind, storm surge)	a) National Electrical Safety Code (NESC) (specifically Rule 250C, Extreme Wind) b) American National Standard Institute (ANSI) c) American Society of Civil Engineers (ASCE) ASCE 24-14 Flood Resistant Design and Construction d) ASCE Manual 113 – Substation Structure Design Guide e) ASCE 7-10 – Minimum Design Standards for Buildings and Other Structures f) American Association of State Highway and Transportation Officials, AASHTO, LRFD Bridge Design Specifications, 7th Edition g) American Concrete Institute, ACI 318/318R, Building Code Requirements for Structural Concrete	i. Design and construct new transmission lines with wind loading capability to be able to withstand certain levels of wind and storm surge specified in the standard. ii. For existing transmission lines, as industry standards evolve over time, this may result in addition of dead-ends, replacement of structures, and strengthening structure hardware. iii. Design and construct new substations with elevations set to avoid water damage resulting from storm surge. iv. Design and construct new substations with concrete foundations that can withstand the effects of storm surge. v. Design and construct new substations with control enclosure (i.e., control house) that can withstand the effects of wind damage. vi. To improve resiliency of transmission lines for unpredictable weather events, LCRA TSC has incorporated placement of containment (dead-end) structures at strategic intervals.

[1] Tex. Util. Code § 38.004(a).

Weather Emergency Condition	Applicable Industry Standard(s)	Aspects of Facility Design and Construction
	h) Concrete Reinforcing Steel Institute, CRSI, for design and placement of structural concrete i) American Society for Testing Materials, ASTM, for specification of structural materials j) ASCE Manual of Practice-74, Guidelines for Electrical Transmission Line Structural Loading	
II. Ice accumulation	a) National Electrical Safety Code (specifically Rule 250D, Extreme Ice with Concurrent Wind Loading)	i. Design and construct new transmission lines with ice loading requirements that meet or exceed those in the NESC.
III. Flood	a) National Electrical Safety Code b) American Society of Civil Engineers (ASCE) ASCE 24-14 Flood Resistant Design and Construction c) ASCE Manual 113 – Substation Structure Design Guide d) ASCE 7-10 – Minimum Design Standards for Buildings and Other Structures e) American Association of State Highway and Transportation Officials, AASHTO, LRFD Bridge Design Specifications, 7th Edition f) American Concrete Institute, ACI 318/318R, Building Code Requirements for Structural Concrete g) Concrete Reinforcing Steel Institute, CRSI, for design and placement of structural concrete h) American Society for Testing Materials, ASTM, for specification of structural materials	i. Avoid siting new substations within a defined FEMA floodplain. ii. Design and construct projects with critical equipment set to 2 feet above the defined FEMA floodplain elevation. iii. Design and construct new substations with concrete foundations that can withstand the effects of storm surge. iv. Design and construct transmission lines such that electrical clearances are maintained without derating the circuit.
IV. Drought (wildfire risk)	a) American National Standard Institute (ANSI) C.37.32	i. Design and construct new transmission lines utilizing steel or concrete transmission line structures (avoiding wood structures where appropriate). ii. Design and construct new transmission lines with sufficient right-of-way to safely access and maintain assets. iii. Design and construct new substations with sufficient clearance between electrical phases and insulation levels to avoid flashover conditions that may initiate fires.

As detailed above, LCRA TSC designs its facilities to meet or exceed industry standards. LCRA TSC's transmission facilities are located across the state in multiple NESC weather loading zones, although most are in the NESC Light and NESC Medium loading zones for combined ice and wind. Nonetheless, LCRA TSC has taken a conservative approach in designing its transmission lines under more stringent cases.[2] During Winter Storm Uri, LCRA TSC's transmission system experienced interruptions on only 29 out of about 600 circuits, or approximately 5 percent of its system.

B. LCRA TSC Transmission Line Resiliency and Reliability Initiatives

In addition to designing, building, and operating its transmission line facilities in accordance with the various weather-related industry standards listed in the table above, LCRA TSC has implemented several initiatives to improve the reliability, resiliency, and availability of its transmission system during extreme weather events. Initiatives 1 and 6 fulfill specific LCRA TSC obligations regarding PUC storm hardening and emergency operation requirements. Initiatives 2 through 5 can be thought of as prudent actions "above and beyond" the base set of applicable industry standards which are further informed by utility best practices, historical events, and factors unique to LCRA TSC's service territory. These initiatives are briefly described below.

1. Transmission Line Storm Hardening Projects

Transmission line storm hardening is an initiative overseen by the PUC requiring each electric utility to develop a Storm Hardening Plan that provides for the implementation of cost-effective strategies to increase the ability of its facilities to withstand extreme weather conditions.[3] Storm hardening encompasses all activities related to improved resiliency and restoration times, including emergency planning, construction standards, and vegetation management.

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[2] In addition to these cases, LCRA TSC also designs for NESC Heavy, NESC Extreme Wind, NESC Extreme Ice, and NESC Extreme Ice plus Wind. Additional load factors are applied to all weather loading cases.

[3] *See generally* 16 Tex. Admin. Code (TAC) § 25.95.

In connection with this initiative, LCRA TSC has invested more than $80 million on 130 storm hardening system improvement projects since 2016. This effort proved especially beneficial when LCRA TSC facilities in the Corpus Christi area performed well in response to Hurricane Harvey, as LCRA TSC has previously reported in its Storm Hardening updates to the Commission. Presently, LCRA TSC is investing an additional $18 million as part of in-flight storm hardening projects across its transmission system.

Relatedly, the PUC also requires annual reporting on electric utilities' infrastructure improvement and maintenance activities.[4] This reporting gives the Commission additional insight into (1) the areas within a utility's service territory that are susceptible to damage during severe weather, (2) the utility's activities related to hardening facilities in those areas, and (3) vegetation management and inspection activities.

2. Transmission Line Overhaul Projects

LCRA TSC's Maintenance and Transmission Line Engineering departments routinely perform condition assessments and structural analyses along LCRA TSC's transmission system to determine the scope and extent of maintenance required for each line and to ensure that each line can operate in expected extreme weather conditions. When LCRA TSC determines that a transmission line or a portion of a transmission line requires remediation, LCRA TSC overhauls or rebuilds the line. The overhaul or rebuild project may involve replacing structures, conductor, or other hardware to ensure the transmission line can meet the requirements of the standard during extreme weather conditions.

3. Flood and Erosion Mitigation Projects

LCRA TSC patrols and inspects its transmission system to identify erosion and flooding issues that may occur in proximity to its transmission line and substation structures. If LCRA TSC

[4] *Id* § 25.94.

determines that erosion or flooding have the potential to affect the integrity of or compromise a structure, LCRA TSC initiates a project to reduce the risk of erosion or flooding issue to the transmission facilities. Depending on the location and potential impact, the project may involve relocating, fortifying, or replacing structures. In some cases, the project includes controlling or diverting drainage to prevent potential structural impacts.

4. Containment Structure Projects

To improve the reliability and resiliency of its transmission system particularly during extreme weather events, LCRA TSC installs containment structures (i.e., full dead-ends) along portions of its transmission lines. These containment structures may be installed at the first structure position outside of substations, and on both sides of river and lake crossings, certain roadways, railways, and other transmission line crossings. Containment structures are designed to limit non-controlled cascading failures, improve public safety, and enhance the resiliency of the transmission system by withstanding a failure mode that leads to multiple structure failures and "containing" any such damage to a more limited area.

5. System Planning for Resiliency

LCRA TSC has developed specific transmission system planning criteria to help ensure reliable electric transmission service during various conditions, including extreme weather. For example, these planning criteria require that LCRA TSC will provide a second, diverse transmission feed (i.e., looped service) to all radially supplied substations serving 20 megawatts (MW) of peak load. Often, these load-serving substations are located in more remote areas of LCRA TSC's system that may not be as readily accessed in the event of an emergency. This standard ensures that transmission service to these substations can still be maintained in the event one of the transmission lines experiences an interruption during an extreme weather event.

Similarly, LCRA TSC implements a system planning criterion that serves to sectionalize or sub-divide transmission lines that serve load exceeding 10 MW. The installation of substation circuit breakers provides for reduced customer outage impact should transmission line faults occur due to inclement weather.

6. Transmission System Emergency Operations

The PUC also has oversight over each transmission and distribution utility's emergency operations. The Commission's rules require utilities to develop a plan that, among other things, addresses wildfire mitigation efforts; identifies potentially severe weather events (including tornadoes, hurricanes, severely cold weather, severely hot weather, and flooding); requires inventory of pre-arranged supplies for emergencies; and addresses staffing during severe weather events.[5] In accordance with these requirements, LCRA TSC has developed specific policies and procedures to allow for the provision of continuous and reliable service during severe weather emergencies. LCRA TSC performs periodic emergency operation drills to exercise and continuously improve its emergency operation plans and preparedness.

Commission rules and ERCOT Nodal Protocols and Operating Guides also direct TSPs like LCRA TSC to coordinate operations in anticipation of, and during, emergencies and any other interruptions of service.[6] Even beyond the requirements of those rules and protocols, LCRA TSC works diligently to bring all available facilities into service that are undergoing maintenance in anticipation of forecasted severe weather and complies with all PUC and ERCOT-directed summer outage restrictions.

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[5] *See generally* 16 TAC § 25.53.

[6] *Id.* § 25.200; *see also* ERCOT Nodal Protocols §§ 3.1 (Outage Coordination), 3.21 (Submission of Emergency Operations Plans, Weatherization Plans, and Declarations of Summer and Winter Preparedness), 6.5.9 (Emergency Operations).

III. SUMMARY AND CONCLUSION

TSPs are subject to an extensive framework of standards and regulations governing the design, construction, operation, and maintenance of their facilities, aimed at ensuring reliable and continuous service during weather emergencies. These standards provide a sound technical basis from which the Commission can develop specific and measurable weatherization requirements. Requiring TSPs to demonstrate that they have met applicable industry design standards, as well as develop and adhere to solid operational practices and planning criteria, are prudent and cost-effective ways to reduce to the frequency and duration of transmission outages and minimize the impact to end-use customers during severe weather events. LCRA TSC respectfully submits that the model the Commission has already developed for periodic reporting on TSP storm hardening activities would be well suited to the Commission's oversight of these additional aspects of weatherization preparedness.

LCRA TSC appreciates the Commission's consideration of these comments and looks forward to working with the Commission Staff and other stakeholders to develop appropriate rules to enhance the Commission's oversight of utility weatherization standards and practices.

Respectfully submitted,

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